

## Pelvic inflammatory disease, correlation between clinical and laparoscopic diagnosis – A review.

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**Abstract: Background:** Ascending infections of the upper genital tract are associated with morbidities such as infertility, chronic pelvic abscess, chronic pelvic pain, and ectopic pregnancy, if not treated properly. The treatment of pelvic inflammatory disease requires accurate diagnosis which largely is dependent on laid out clinical criteria that had been noted to lack specificity. Laparoscopy has been used as a gold standard over time but is not used routinely in the diagnosis of this disease entity.

**Objective:** The objective was to determine the correlation between use of clinical diagnostic criteria and laparoscopy in the diagnosis of pelvic inflammatory disease.

**Design/Method:** An electronic literature search of articles published on the subject from 1969 to 2012, using search engines: Highwire, Springerlink, Hinari, Pubmed, and Google were analyzed.

**Outcome:** There is poor correlation between clinically diagnosed pelvic inflammatory disease and laparoscopic confirmations resulting in over diagnosis of the disease. **Conclusion:** Clinical criteria for the diagnosis of pelvic inflammatory disease have a low predictive value. The routine use of laparoscopy appears to be a better option to reduce over diagnosis of this condition, missed diagnosis of other pelvic pathology, and ultimately to reduce expenditure incurred in overtreatment.

**Key words:** Clinical criteria, laparoscopy, pelvic inflammatory disease

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### I. Introduction

Pelvic inflammatory disease is an infection of the upper genital tract involving all or either of the following structures: cervix, uterus, fallopian tubes, ovaries, and its surrounding structures.<sup>1-3</sup>

There are several risks factors associated with this condition among which are multiple sexual partners, unsafe termination of pregnancies, uterine instrumentation, no previous pregnancy, non use of barrier contraceptive method, intrauterine contraceptive device, early coitache, past history of pelvic inflammatory disease and tobacco smoking, previous stillbirths, and multiple sexual partners.<sup>4-7</sup>

Its improper diagnosis and treatment is a cause of medical and socioeconomic sequelae: It constitutes about 2% of gynaecological consultations of young women to their primary care physician in England and Wales.<sup>8</sup> Adolescents and young adults account for nearly half of the 780,000 cases of PID reported annually in the United States with 250,000 women hospitalized annually and 18/10,000 hospital discharges. Huge budgetary expenditure on its treatment is found in the USA where about 5.5 billion dollars are spent annually on its treatment and sequelae.<sup>9,10</sup> In a resource-poor setting it accounts for 17-40% of gynecological admissions in Sub-Saharan Africa, 15- 37% in South East Asia, and 3% in India.<sup>11</sup>

PID has been associated with chronic pelvic pain, tubovarian abscess and ectopic pregnancies, menstrual abnormalities, and sexual dysfunction.<sup>12</sup> Tubal pathology resulting in infertility due to PID range from 35% in developed to 85% in developing countries with resultant increase in the rate of ectopic pregnancies - a sevenfold increase in rate as against those without ectopic pregnancy.<sup>13,14</sup>

### Etiology

The main microbial organism implicated in the cause of PID is Chlamydia trachomatis, N gonorrhoea and organisms associated with bacterial vaginosis.<sup>15-17</sup> Following the primary infection a milieu is formed for other aerobic and anaerobic organisms to produce a secondary infection by *staphylococcal spp.*, *streptococcal spp.*, *coliforms*, and *hemophilus influenza* organisms. Anaerobes such as fusobacterium, peptococcus, and variety of clostridium organisms have also been implicated.<sup>18,19</sup> The increase in the prevalence of HIV has resulted in a higher incidence of mycobacterium tuberculosis bacilli isolated in endometrial samples of patients with PID.<sup>20</sup> Since the 1970s, the overall incidence of gonococcal infections had reduced with a corresponding increase in the incidence of Chlamydia infections in both developing and developed countries, this is as a result of increased awareness of the disease and the availability of more sensitive testing methods.<sup>21-23</sup>

### **Route of infection/pathology**

Most cases of pelvic inflammatory disease are due to ascending infections of the genital tract transversing the endocervix into the uterus, fallopian tubes, and adjoining structures of the uterus. Only 10 - 20% of lower reproductive tracts infections organisms ascend into the upper genital tract to cause disease and even smaller percentage of women with PID develop chronic sequelae. Microbes can be introduced during sexual intercourse or during cervical instrumentation procedures. The response of the host immune system and the type of organism determine the range of clinical manifestations of the disease condition resulting in either or all of the following: cervicitis, endometritis, salpingitis, salpingo-oophoritis, tubovarian abscess, pelvic peritonitis or abscess formation.<sup>[1,23]</sup>

### **Diagnosis of pelvic inflammatory disease -- clinical features vs. laparoscopy**

Variations in the etiology and the immune responses of host to the causative organisms makes features of this disease non-pathognomonic with each clinician developing independent diagnostic criteria. This poses a clinical challenge to clinicians resulting in missed diagnosis of other clinical disease entities or an over diagnosis of PID. The commonly used diagnostic protocol was that developed by Jacobson and Westron in 1969 which tags a patient with PID, if acute lower abdominal pain/pelvic pain is accompanied by symptoms/signs of either two of the following: abnormal vaginal bleeding, menstrual anomalies, proctitis, fever, vomiting urinary symptoms, marked pelvic tenderness palpable abdominal mass or swelling with an erythrocytes sedimentation rate of >15 mm/h.<sup>[24]</sup> In order to further improve on the specificity of the clinical diagnosis criteria agencies such as the Centre for Disease and Control<sup>[25]</sup> had modified the diagnostic criteria of Jacobson specifying three minimum diagnostic criteria identified on pelvic examination as

- lower abdominal pain
- cervical motion tenderness
- uterine tenderness/adnexae tenderness.

One or more of the following additional criteria can be used to enhance the specificity of the minimum criteria and support a diagnosis of PID:

- oral temperature >101°F (>38.3°C);
- abnormal cervical or vaginal mucopurulent discharge;
- presence of abundant numbers of WBC on saline microscopy of vaginal fluid;
- elevated erythrocyte sedimentation rate
- elevated C-reactive protein
- laboratory documentation of cervical infection with *N. gonorrhoea* or *C. trachomatis*.

A large multisite U.S. study found that using the adnexae tenderness as the minimal criteria raised the sensitivity of the Centre for Disease Control and prevention criteria from 83% to 95% and that even the modified 2002 CDC criteria failed to identify the women with subclinical PID who are at the same risk of having long-term sequelae if their disease is not treated.<sup>[2,26]</sup>

Thus despite the formulations of various guidelines, the diagnostic criterion of pelvic inflammatory diseases still remains an enigma. In order to overcome this diagnostic clinical dilemma, standard findings at laparoscopy were adopted as the “gold standard” for its diagnosis.<sup>[24]</sup> However its cost, requirement of general anesthesia, need for trained medical personnel, and nonvisualization of some areas of the uterus had impaired its utilization; especially in developing countries where diagnosis is still largely based on unspecific clinical features.<sup>[27,28]</sup> Laparoscopic criteria for visual diagnosis of acute pelvic inflammatory disease include marked hyperemia of the tubal surface, edema of the tubal wall, and sticky exudate on the surface of the tube and fimbriae ends when open.<sup>[24]</sup> These criteria are helpful in identifying sequelae of chronic pelvic inflammatory disease such as pyosalpinx which is diagnosed when tubes are enlarged, edematous with partial or total destruction of the fimbriated end.

## **II. Materials And Methods**

An electronic search of literature concerned with diagnosis of pelvic inflammatory disease using clinical criteria and laparoscopy and other related information was conducted. The period of interest was from 1968 to 2012 using the search engines: Highwire, Pubmed, Springerlink, and Google. The results of the search were collated in a tabular form and the predictive values calculated in percentage.

## **III. Results**

The results of the electronic search are as shown in Table 1:

Results were collated in terms of the authors, sample size, number of patients diagnosed clinically, and the corresponding number confirmed by laparoscopy and predictive value calculated in percentage. Results and recommendations of investigators were also examined.

**Table 1: Studies comparing percentage of accuracy of clinically diagnosed PID vs. laparoscopically confirmed disease**

Authors	Clinically diagnosed	Laparoscopically diagnosed	Percentage of accuracy (%)
Jacobson <i>et al.</i> , 1969 <sup>[24]</sup>	814	532	65.4
Chaparro <i>et al.</i> , 1978 <sup>[29]</sup>	223	103	46.1
Burchell <i>et al.</i> , 1987 <sup>[30]</sup>	40	22	55
Hadgu <i>et al.</i> , 1987 <sup>[31]</sup>	628	414	65.9
Westrom <i>et al.</i> , 1992 <sup>[32]</sup>	2501	1884	75
Marcos <i>et al.</i> , 1993 <sup>[33]</sup>	176	134	76.1
Eschenbach <i>et al.</i> , 1997 <sup>[34]</sup>	155	127	82
Molander <i>et al.</i> , 2000 <sup>[35]</sup>	33	20	60.1
Cibila <i>et al.</i> , 2001 <sup>[36]</sup>	141	44	31.2
Laiama <i>et al.</i> , 2009 <sup>[37]</sup>	73	52	71.2
Total no. of patients	4784	3332	69.6

#### IV. Discussion

The overall positive predictive value (PPV) of a clinical diagnosis of PID was 69.7% when confirmed by laparoscopy which implied that 30.3% of patients were wrongly diagnosed for pelvic inflammatory disease because of the nonspecific nature of the clinical diagnostic criteria. In their series of 814 cases, Jacobson *et al.* had 532 cases of suspected PID confirmed using laparoscopy, 12% had other pathological conditions, and 23% had no obvious pathology. The essence of early diagnosis and treatment was noted in the finding of increased potential of tubal patency in patients identified and treated before adnexae mass or tenderness was diagnosed clinically.<sup>[24]</sup>

In support of the laparoscopic diagnosis, Simm *et al.*<sup>[38]</sup> found a low specificity and sensitivity for commonly used clinical features such as abnormal vaginal discharge, irregular vaginal discharge, marked tenderness on bimanual examination, and ESR >15 mm/h. There was little variation observed in the likelihood ratio and post-test probabilities among the variables studied. The discriminatory analysis showed that three indexes largely influenced the prediction of PID, i.e., ESR ( $P < 0.001$ ), fever ( $P < 0.0001$ ), and adnexae tenderness ( $P < 0.0001$ ).

Similar studies by Burchell and Schoon confirmed clinically diagnosed PID by laparoscopy in 55% of the patients and used same method in differentiating other life-threatening conditions to the patient like ectopic pregnancy and acute appendicitis in 15% of patients who would have been missed by the use of clinical diagnostic criteria. In addition, they confirmed the superiority of laparoscopically assisted microbiological specimens against the vaginal specimen.<sup>[30]</sup>

Furthermore, Morcos *et al.* confirmed a predictive value of 76.1% for clinical diagnosis of PID. They identified that the optimal set of PID indicators consisting of adnexae tenderness, lower abdominal pain of less than 1-week duration, and an elevated white cell count had sensitivity and specificity of 86.6% and 45.7% respectively with estimated predictive values for positive and negative tests being 0.84 and 0.52 respectively. They advised a must use of laparoscopy in the diagnosis of PID.<sup>[33]</sup>

Cibula *et al.* in their prospective analysis of patients with acute recurrent PID clinically diagnosed PID confirmed diagnosis in 30% of patients. Adhesions without features of PID were found in 16% of patients and they suggested that cases of PID recurrence and laboratory findings of such should be confirmed or excluded by laparoscopy.<sup>[36]</sup>

Using accepted clinical diagnostic criteria, Ieima *et al.* did a prospective study of 73 clinically diagnosed patients with PID and had a predictive value of 71.2%. This finding suggested that laparoscopy improved the diagnosis of pelvic inflammatory disease and determined the severity of the clinical condition though sensitivity for milder cases may be lower.<sup>[37]</sup>

Some investigations have questioned the use of laparoscopy in making a diagnosis. Sellors *et al.* demonstrated 50% sensitivity and 85% specificity if laparoscopy is compared with histological analysis of fimbriae samples and Eckert *et al.* demonstrated that in 152 cases of clinically diagnosed PID, 26 had histological diagnosis of endometritis without laparoscopic evidence.<sup>[39,40]</sup> Nevertheless the clinical application of these modes of diagnosis is largely impracticable and may worsen the patients' clinical state hence the need for supplementary much lesser hazardous intervention.

One of the reasons put forward by opponents of the routine use of laparoscopy is the financial implications of its use; however, Method *et al.*, in a review of the costs of hospitalization, treatment and the inherent diagnostic error rate of clinically diagnosed patients, found no significant additional expense if all the women admitted with a clinical diagnosis of PID had had laparoscopic verification of their clinical diagnoses compared to the

cost of treatment with intravenous antibiotics for 3-5 days and thus recommended the early use of laparoscopy in establishing the diagnosis of PID because it ensures a more accurate and definitive diagnosis and does not add significantly to costs.<sup>[41]</sup>

## V. Conclusion/Recommendations

Based on the nonspecific nature of several clinical diagnostic criteria and low predictive value for pelvic inflammatory, the use of laparoscopy in the diagnosis of this clinical condition appeared justified. Its use will facilitate the identification of life-threatening gynecological conditions that may be missed and also permit carrying interventional therapy for patients having tubovarian masses and abscess as part of the spectrum of disease entity.

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*Pelvic inflammatory disease, correlation between clinical and laparoscopic diagnosis -- literature*

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